



# ms1



A stand-alone, precision, hand-held instrument for relative humidity and temperature measurements in rooms, air ducts and for material measurements

<b>Relative humidity:</b>	<b>6...98% rh</b>	non-condensing
<b>Temperature :</b>	-10...50°C	
	-20...80°C	with remote sensor
<b>Precision :</b>	<b>+/- 1% rh</b>	10...90% rh at 25°C and calibration at all 5 reference points
	<b>+/- 0.3°C</b>	
<b>Communication :</b>	Optional RS-232 interface for a printer (controlled by the ms1), or PC (software available).	
<b>Further parameters:</b>	the ms1 directly shows the relative humidity and the air temperature (dry bulb temperature) . The built-in processor also makes it possible to display the following Mollier diagram parameters	
	<ul style="list-style-type: none"> <li>• Dewpoint</li> <li>• Mixing ratio</li> <li>• Wet bulb temperature</li> <li>• Specific enthalpy</li> <li>• Vapour pressure</li> </ul>	



## The ms1 humidity & temperature measurement system

*Precise, fast, versatile*

A practical, 1'000-times proven precision, hand instrument for humidity and temperature measurements. Thanks to its resistive electrolyte measurement principle, the ms1 is particularly well suited to high precision humidity measurements in air and other gases. Other special advantages are its robustness and long-term stability, as well as simple checking and recalibration functions using the Novasina Sensor Checks.

The sensor has outstanding repeatability. Hysteresis is essentially not measurable. The integrated computer makes it possible to display a number of Mollier h,x Diagram parameters of particular importance to all climate and ventilation professionals.

The large, clear, multifunction LCD display has excellent contrast. The instrument incorporates a shut down function to conserve battery power. Other options include a power supply and an RS-232 interface to transmit data to a printer or PC (software available).

Typical **ms-1** applications:

- Heating, ventilation and air conditioning
- Room climate measurements in research and development laboratories
- Local climate control in, for example, the electronics, pharmaceutical, chemical, biology, food preparation industries
- Material humidity measurements in for example concrete, wood, paper, and also in pharmaceuticals and chemicals.

### Measurement instrument ms1:

Dimensions	: 54x43x265mm
Weight	: 280 g
Power	: Battery 9V DC

### Humidity measurement:

Resistive electrolytic measurement cell	
Range	: 6...98% rh
Repeatability	: +/- 0.3% rh
Precision	: +/- 1.0% rh
(in temp. range from 10...50°C and 10...90% rh )	

### Temperature measurement:

very precise NTC resistance	
Range	: -20...80°C
Repeatability	: +/- 0.1°C
Precision	: +/- 0.3°C

**Note:** Application and measurement range with the sensor mounted directly on the ms1: -10...50°C.

With a remote sensor connected by an extension cable or tube: -20...80°C.

### Sensor Checks SC:

Humidity standards based on saturated salt solutions in plastic cylinders with a moisture permeable membrane. Values: 11%, 33%, 53%, 75%, 90%rh.



## ms1 measurement instrument

Consisting of:



**111 0534** ms1 basic set

### Basic set ms1

The portable ms1 measurement instrument is supplied in an impact-resistant plastic case with two humidity standards.

The case also has space for further options, including a power supply, RS232 interface, surface temperature sensor etc.

### Carrying case with:

Measurement instrument ms1  
9V battery  
Measurement cell enCK-3  
Plastic rack for the ms1  
Sensor Check SC 33% rh  
Sensor Check SC 75% rh  
Polystyrene box for calibration  
User manual  
Manufacturers procedure for the 5-point calibration 11-33-53-75-90%  
Weight (instrument): 220 g

## ms1 accessories



**111 1564** Power supply 230V

**111 1406** Power supply 115V

### 230V or 115V power supply

The power supply is recommended when the ms1 is used for a long period in one place, or to preserve battery power when the RS 232 interface is extensively used.

-> The ms1 does not recharge batteries. If rechargeable batteries are used an external charger is needed.

### Power supply:

230V AC +/- 10% / 50-60Hz  
115V AC +/- 5% / 50-60Hz

Output : 9 V DC / 16 mA  
Power requirement: 0.4 VA  
Plug : 4 mm diameter coax  
Weight : 250 g



**111 3542** Extension cable

### Extension cable for ms-1

1.5m long cable with 9-pin plugs for remote measurements with the ms1. Use of the extension cable does not require recalibration of the instrument.

-> Recalibration is not necessary if an extension cable is used.

### Extension cable for ms1:

Extension cable 1.5m  
9-pin special connectors for ms1 and enCK-4/5 cell  
Weight : 120 g



**111 0898** Surface temp. sensor

### Surface temperature sensor

A separate (NTC) temperature sensor for measuring surface temperatures of walls etc. This plugs in to the side of the ms1 and disables the built-in temperature sensor of the ms1.

### Surface temperature sensor:

Range : -20...80°C  
Repeatability : +/- 0.1° C  
Precision : +/- 0.3° C  
Weight : 70 g



**111 0846** HOG-00 Extension

### Extension tube HOG- 00

Fits the ms1 base instrument and enCK-3 sensor. Connects the sensor to the ms1 for applications in air ducts and enclosures.

-> Use of the extension tube does not require recalibration of the instrument.

### Extension tube HOG-00:

Length : 240 mm  
Weight : 110 g

Material : Aluminium / Polycarbon



**111 0826** PC interface

### PC communication via RS232

RS232 interface, 1m long cable, software CD  
Including NOVALOG 32 for Win 9x/2000/NT.

### Interface Set comprising:

- 1m cable with D-Sub 25/25-pin.
- RS-232 Interface
- Software CD with NOVALOG 32 for Windows systems
- User manual

Weight: 440 g



--- Example Seiko printer

### ms1 local printer system

**Attention:** Any printer must be obtained locally

**! Novasina does not supply printers !**

#### ms1 printer system:

Portable smart printer system to connect the ms1 handheld instrument via an interface box directly with a standalone battery powered thermal transfer printer

*Other printers may be used*



**111 0562** Seiko interface

### RS232 interface for Seiko printer

RS-232 interface, 1m long cable to connect a Seiko **DPU 411** thermal printer. This makes it possible to control the printer using the printer parameters defined in the ms1 menu.

**Attention:** The printer must be obtained locally.  
(Problems may arise with local language support)

#### Seiko printer Interface set:

Weight: 280 g  
- 1m long printer cable  
- D-Sub 25/25-pin  
- RS 232 interface box ms1  
- Seiko adapter box.



**111 6256** Adapter 25F/9M

### D-Sub adapter 25F/9M

Adapter for the RS232 Interface for the Seiko printer, 111 0562, permitting connection to the more recent Seiko **DPU 414** printer.

#### Adapter Interface:

Dimensions : 60 x 40 x 20 mm  
Weight : 50 g

Adapter D-Sub 25F/9M  
25-in female connector  
9-pin male connector



**111 0661** Epson interface

### RS232 interface for Epson printer

RS-232 interface, 1m long cable to connect an Epson or other compatible 9-pin needle printer. This makes it possible to control the printer using the printer parameters defined in the ms1 menu.

**Attention:** The printer must be obtained locally.  
(Problems may arise with local language support)

#### Epson printer Interface set:

Printer cable is an flat cable  
- Length 1 m  
- D-Sub 25/25-pin connector  
- ms1 RS 232 interface  
- Epson adapter

Weight: 300 g



**111 8426** Seiko Thermal paper

### Thermal paper replacement rolls

*Printer type: Seiko DPU 411, 414*

**Attention:** This paper must be stored in a dark and dry place. This is thermal transfer paper only intended for Seiko printers

**Note:** Set of 5 rolls, each 25m long

#### Thermal paper replacement:

Set of 5 rolls, each 25 m long.  
Weight : 850 g ( Set )

Thermal paper for Seiko printer  
Models DPU 411 and 414

Paper width 11cm



**111 0885** -> 11% rh  
**111 0855** -> 33% rh  
**111 0857** -> 53% rh  
**111 0859** -> 75% rh  
**111 0896** -> 90% rh

### Sensor-Checks SC

Humidity standards based on saturated salt solutions in plastic cylinders with moisture permeable membranes. Each salt is delivered in a well-sealed box. Sensor Checks SC are obtainable for the following values (at 25°C):

11.3 %	colour	white
32.8 %	colour	blue
52.9 %	colour	green
75.3 %	colour	purple
90.1 %	colour	white

#### Humidity values in the temperature range 15° .... 30°C:

11.3	.....	11.3% rh
33.3	.....	32.4% rh
55.9	.....	51.4% rh
75.6	.....	75.1% rh
90.9	.....	89.9% rh

The precision corresponds to the Greenspan Report 1977 typically +/- 0.3 % rh

Weight: 90 g



**111 1044** -> 11% rh  
**111 1037** -> 33% rh  
**111 1040** -> 53% rh  
**111 1035** -> 75% rh  
**111 1032** -> 90% rh

### Sensor-Checks SC with European certificate

Humidity standards based on saturated salt solutions in plastic cylinders with moisture permeable membranes. Each salt is delivered in a well-sealed box. Sensor Checks SC are obtainable for the following values (at 25°C):

11.3 %	colour	white
32.8 %	colour	blue
52.9 %	colour	green
75.3 %	colour	purple
90.1 %	colour	white

#### Internationally accredited laboratory



All Novasina humidity standards can also be supplied with an internationally recognised certificate from an accredited European (UKAS England).

Weight: 90 g



Prices see on the pricelist

### ms1 certification

in an accredited European laboratory

A UKAS-laboratory will certify the instrument at two or more humidity values and at several different temperatures if required.

#### Internationally accredited laboratory



Certified instruments can be supplied.



**111 7847** Sensor-check Set  
**111 7841** Empty case for set

### Set with 5 Sensor-Checks SC

Humidity standards based on saturated salt solutions in plastic cylinders with moisture permeable membranes. Each salt is delivered in a well-sealed box. Sensor Checks SC are obtainable for the following values (at 25°C):

11.3 %	colour	white
32.8 %	colour	blue
52.9 %	colour	green
75.3 %	colour	purple
90.1 %	colour	white

#### Case with all 5 Sensor Checks from 11 to 90%rh:

Humidity values in the temperature range 15° .... 30°C:

11.3	.....	11.3% rh
33.3	.....	32.4% rh
55.9	.....	51.4% rh
75.6	.....	75.1% rh
90.9	.....	89.9% rh

The precision corresponds to the Greenspan Report 1977 typically +/- 0.3 % rh

Weight: 900 g



## Replacement parts for the set ms1



**111 0978** enCK-3

### Sensor enCK-3

Standard humidity sensor for the ms1.

This sensor is mounted directly on the ms1, but can also be used with an extension cable or tube.

**Information:** recalibration of the ms1 at a minimum of two points is required when a sensor is replaced. High precision requires a 5-point recalibration.

### Sensor enCK-3:

Dimensions : 58 x 22mm  
Weight : 10 g

### Humidity measurement:

Range : 6...95 % rh  
Attention : No saturation protection  
Repeatability: < 0.3 % rh  
Precision : +/- 2.0 % rh  
Basis : 5-Point cal. with SC salts at 25°C

### Temperature Measurement:

Range temp : -20...80°C  
Repeatability : +/- 0.1° C  
Precision : +/- 0.3° C



**1110985** Metal web eVMT-83  
**1112569** Sintered eVM-83I

### Cell protection filters to enCK-3 sensors

A number of filters are available to protect the measurement cell from abrasion or corrosive vapours.

-> Please consult the appropriate datasheets

### Metal web filter eVMT-83 to enCK-3:

Dimensions : 68 x 30 mm  
Effect: mech. protection against particles larger than 0.3 um  
Weight: 40 g

### Sinter filter eVM-83I to enCK-3:

Dimensions: 55 x 30 mm  
Effectiveness : mech. protection against particles larger than 0.1 um  
Weight : 90 g

## ms1 instrument options



**111 6716** enSARK

### Sensor enSARK-3

with 2m connection cable and 9 pin plug

A 13 mm diameter sensor rod with a duroplast tip, CK-3 humidity measurement cell, and NTC temperature sensor. Designed for measurements in, for example, material in granulated form in sacks, tanks and silos.

### See also Set AM/Set and AMS:



Example: humidity measurements of granulates, sawdust, or tobacco in a sack

Weight: 210g



**110 7345** Adapter CH

### Sensor check adapter ch

for any 13mm sensor to SC-check salt standard

This adapter is needed for calibration an instrument. It ensures an airtight connection of a Sensor Check to the sensor tube of the top of the instrument. It reduces the diameter of 20 mm down to 13 mm and ensures an airtight seal.

-> The adaptor should first be attached to the sensor and then to the SC check. Both seals should be carefully checked, leaks will bias the calibration.

### CH adapter for any 13mm sensors to SC checks:

Dimensions : 30 x 13 mm  
Material : Polycarbonate, rubber

Weight : 5 g

### Replacement tip for Sensor enSARK-3

A hard plastic tip to ease the insertion of SARK sensors into materials

-> Not usable with the older SARK sensors



**111 6497** enSARK tip

### Tip to sensor SARK:



Material: POM black  
Weight: 5 g





**111 1013** CK-3 measurement cell

### Replacement measurement cell CK-3 for the enSARK-3, enCSK-3 sensors

Humidity measurement without temperature sensor or saturation protection.

Can be exchanged by hand after removal of the filter. The filter surface on the top of the cell should not be touched.

**Information:** recalibration of the ms1 at a minimum of two points is required when a sensor is replaced. High precision requires a 5-point calibration.

### Humidity measurement cell CK-3:

Humidity measurement:  
Range : 6.....95 % rh  
(98% non-condensing)  
Attention : No saturation protection.  
Repeatability: < 0.3 % rh  
Precision : +/- 2.0 % rh  
Basis : 5-Point cal. with SC salts at 25°C  
Weight : 1 g



**110 6562** Polycarbonate tubes

### Set of 10 external tubes

Set of 10 precision, reusable tubes with closing caps for humidity measurements in concrete floors or walls using the enSARK-3 sensor. The tubes are inserted in boreholes in the concrete floors or walls. The humidity is measured with a SARK sensor once a stable value has been reached.

### Set of 10 Precision tubes: including cover plate for material measurements

Weight: 220g a set

Application:

- Make an opening in the wall/floor.
  - Insert the tube.
  - Wait for the humidity to stabilise.
  - Measure the humidity using an ms1 and a SARK Sensor.
- (See also Set AM )



**111 0852** Conical sensor

### Conical sensor enCSK-3

Conical sensor for measurement in vats, or directly in materials. Incorporates a sintered filter to protect the measurement cell. Incorporates a sintered filter for protection against fine dust and damage. Delivered with a 1m cable and 9-pin plug. I

### Conical sensor to ms1:

Dimensions : 100 x 14 mm  
Cable length : 1m  
Connector : 9-pin plug for the ms1 instrument  
Humidity cell : CK-3 incl. NTC element for temp. measurement  
Range : 6..95%rh / -20..+80°C  
See also ms1 set M



**111 0526** Box sensor enMBRK-3

### Box sensor enMBRK-3

A special sensor for humidity and water content measurements of large quantities of foodstuffs, e.g. potato chips, tea leaves, granulates.

-> Includes the conical sensor enCSK-3 (Nr. 111 0852)

### Box sensor enMBRK-3: (incl. Conical sensor enCSK-3)

Cable length: 1m  
Connector : 9-pin plug for the ms1  
Weight : 275 g



See also Set M



**111 1467** Sintered filter

### Sintered filter

For the conical sensor enCSK-3 (111 0852) and box sensor (111 0526).

**Attention:** carefully unscrew the conical sensor when changing the filter

### Sintered filter for conical sensor:

Dimensions: 25 x 16 mm  
Material : Sintered brass  
Weight : 30 g



**111 1023** adapter CS

### Adapter CS

*for enCSK-3 sensor to SC-check*

This adapter is needed for calibration of the enCSK sensor with the salt SC checks. It ensures an airtight connection of a Sensor Check to the conical sensor.

- > Adapter CS only for the conical sensor
- > Attach the adapter to the conical sensor first and then to the SC-check. Check that it is well-sealed.

### Adapter CS to conical sensor:

Dimensions : 30 x 13 mm  
Material : PE plastic  
Weight : 5 g

*The adapter has no gasket on the sensor side. The cone itself provides an airtight seal.*



**111 1083** 9V battery

### 9V-battery

*Alkali-manganese battery (not rechargeable)*

This battery permits up to 25 hours of continuous operation. If a rechargeable battery is used, an external charger is required. The ms1 cannot perform this function.

### 9V Battery for the ms1:

Dimension : 48 x 25 x 17mm  
Weight : 50 g

Alkali cell battery  
Battery 9V DC, 180mAh  
A standard battery, available in most electronic shops  
Max. storage time : 2 years



**111 1302** Styrofoam box for SC

### Thermal insulation styrofoam box

*For the SC sensor Check system*

A styrofoam box providing optimal insulation and temperature stabilisation of a SC Check SC while calibrating the system. Two half-covers for simple temporary, in situ mounting.

- > Can be used together with the SC calibration kit for optimal thermal protection during calibration

### Styrofoam box for the SC check:

Dimensions : 100 x 65 x 50 mm  
Weight : 10 g

Material : thermal insulating styrofoam PPE